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## CFD code adaptation to the FPGA architecture

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The goal of this work is to adapt 4 CFD kernels to the Xilinx ALVEO U250 FPGA, including first-order step of the non-linear iterative upwind advection MPDATA schemes (non-oscillatory forward in time), the divergence part of the matrix-free linear operator formulation in the iterative Krylov scheme, tridiagonal Thomas algorithm for vertical matrix inversion inside preconditioner for the iterative solver, and computation of the pseudovelocity for the second pass of upwind algorithm in MPDATA. All the kernels use 3-dimensional compute domain consisted from 7 to 11 arrays. Since all kernels belong to the group of memory bound algorithms, our main challenge is to provide the highest utilization of global memory bandwidth. Our adaptation allows us to reduce the execution time upto 40

**Keywords:** CFD, FPGA, Energy efficient, code adaptation.